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GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
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| EXAMINER | |
|---|---|
| THANGAVELU, KANDASAMY | |
| **ART UNIT** | **PAPER NUMBER** |
| 2123 | |

DATE MAILED: 01/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) |
|---|---|---|
| | 09/897,556 | OSBORN ET AL. |
| | **Examiner** | **Art Unit** |
| | Kandasamy Thangavelu | 2123 |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on 03 July 2001.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) 1-57 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-57 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 03 July 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 29 June 2001.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

## DETAILED ACTION

1. Claims 1-57 of the application have been examined.

### *Information Disclosure Statement*

2. Acknowledgment is made of the information disclosure statements filed on June 29, 2001 with a list of papers. The papers have been considered.

### *Drawings*

3. The drawings submitted on July 3, 2001 are accepted.

### *Specification*

4. The disclosure is objected to because of the following informalities:

Page 10, Para 0041, Lines 1-2, "Fig. 4 shows an analysis architecture flow diagram performed by the interactive graphics-based reliability analysis tool 28" appear to be incorrect and it appears that it should be "Fig. 4 shows a flow diagram for the process performed by the interactive graphics-based reliability analysis tool 28".

Page 24, Para 0067, Lines 7-8, "Next, the interactive graphics-based reliability analysis tool determines ave at 288 which is the expected life of part using the equation"

appear to be incorrect and it appears that it should be "Next, the interactive graphics-based reliability analysis tool determines the expected life of part, ave using the equation".

Appropriate corrections are required.

### *Claim Rejections - 35 USC § 112*

5. The following is a quotation of the first paragraph of 35 U.S.C. §112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claims 16-24 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the claim in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

6.1 Independent claim 16 recites a system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem. However, the limitations listed in the claim comprise a statistical analysis component but not a reliability analysis component, as follows:

a statistical analysis component, responsive to the hierarchical representation component and the interactive selection component, that performs a statistical analysis at any level of the hierarchical representation; and

a visualization component that provides a visualization of the statistical analysis in a graphical framework.

It would not be possible for one of ordinary skill in the art to perform the reliability analysis on a system using the statistical analysis component.

6.2 Independent claim 19 recites a system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem. However, the limitations listed in the claim comprise a statistical analysis component but not a reliability analysis component, as follows:

an interactive graphics-based tool for performing a statistical analysis on the system in accordance with the plurality of service data, the interactive graphics based tool comprising:

a statistical analysis component, responsive to the hierarchical representation component and the interactive selection component, that performs a statistical analysis at any level of the hierarchical representation; and

a visualization component that provides a visualization of the statistical analysis in a graphical framework.

It would not be possible for one of ordinary skill in the art to perform the reliability analysis on a system using the statistical analysis component.

Claims rejected but not specifically addressed are rejected based on their dependency on rejected claims.

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 38, 45 and 50-57 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8.1 Claim 38 recites, "The method according to claim 35, wherein the simulating predicts life cycle events and costs associated with each event pulation". There is insufficient antecedent basis for "the simulating" in this limitation, since claim 35 does not refer to simulating. It is also not clear if the Applicants intended claim 35 or claim 36.

8.2 Claim 45 recites in part " the performing of the user specified reliability analysis comprises prompting the user to select from a plurality of analyzing options".

The term "plurality of analyzing options" is undefined, making the claim vague and indefinite.

8.3 Claim 50 recites, "A computer-readable medium storing computer instructions ..., the computer instructions comprising:

organizing the system ...".

The computer instructions cannot comprise various steps, but comprise instructions for executing various steps. Therefore computer instructions comprising:

organizing the system ... is undefined, making the claim vague and indefinite.

8.4 Claim 55 recites, "A computer-readable medium storing computer instructions ..., the computer instructions comprising:

prompting the user to organize the system ...".

The computer instructions cannot comprise various steps, but comprise instructions for executing various steps. Therefore computer instructions comprising:

prompting the user to organize the system ... is undefined, making the claim vague and indefinite.

8.5 Claim 56 recites, "A computer-readable medium storing computer instructions ..., the computer instructions comprising:

storing a plurality of service data for the system ...".

The computer instructions cannot comprise various steps, but comprise instructions for executing various steps. Therefore computer instructions comprising:

storing a plurality of service data for the system ... is undefined, making the claim vague and indefinite.

Claims rejected but not specifically addressed are rejected based on their dependency on rejected claims.

9. Claims 1-18 are rejected under 35 U.S.C. § 112, second paragraph, as being incomplete for omitting essential structural cooperative elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are:

9.1 Claim 1 recites an interactive graphics-based tool for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem. The limitations recited in claim contain a hierarchical representation component, an interactive selection component and a reliability analysis component, which are all software components. Therefore it appears that the interactive graphics-based tool is a software tool which is not statutory subject matter, as explained in Paragraph 12.1 below. To be statutory, the interactive graphics-based tool should be a system or apparatus comprising hardware elements and software components. The Examiner has therefore interpreted the preamble as an interactive graphics-based system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem. Then the interactive graphics-based system should comprise:

a processor for executing instructions;

a memory for storing instructions and data;

a display device; and

an interactive graphics-based tool, comprising:

a hierarchical representation component …

9.2 Claim 7 recites an interactive graphics-based tool for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem. The limitations recited in claim contain a hierarchical representation component, an interactive selection component, a reliability analysis component and a visualization component, which are all software components. Therefore it appears that the interactive graphics-based tool is a software tool which is not statutory subject matter, as explained in Paragraph 12.2 below. To be statutory, the interactive graphics-based tool should be a system or apparatus comprising hardware elements and software components. The Examiner has therefore interpreted the preamble as an interactive graphics-based system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem. Then the interactive graphics-based system should comprise:

a processor for executing instructions;

a memory for storing instructions and data;

a display device; and

an interactive graphics-based tool, comprising:

a hierarchical representation component ...

9.3 Claim 12 recites a graphics-based tool for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem. The limitations recited in claim contain a means for organizing the system and the plurality of subsystems and components into a hierarchical representation, a means for providing a plurality of options for analyzing the hierarchical representation, a means, responsive to the organizing

means and the providing means, for performing a reliability analysis at any level of the hierarchical representation and a means for generating a visualization of the reliability analysis in a graphical framework, which are all software components. Therefore it appears that the interactive graphics-based tool is a software tool which is not statutory subject matter, as explained in Paragraph 12.3 below. To be statutory, the interactive graphics-based tool should be a system or apparatus comprising hardware elements and software components. The Examiner has therefore interpreted the preamble as a graphics-based system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem. Then the graphics-based system should comprise:

a processor for executing instructions;

a memory for storing instructions and data;

a display device; and

a graphics-based tool, comprising:

means for organizing the system and the plurality of subsystems …

9.4 Independent claim 16 recites a system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem. The limitations recited in claim contain only software components. Therefore it appears that the system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem is a software system which is not statutory subject matter. To be statutory, the system should include computer system hardware

components which will be required to implement the software components. Then the system should comprise:

a processor for executing instructions;

a memory for storing instructions and data;

a display device;

a data repository containing ...

Claims rejected but not specifically addressed are rejected based on their dependency on rejected claims.

10. Claims 36-38 rejected under 35 U.S.C. § 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are:

Claim 36 states, "A method for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem, comprising:

storing a plurality of service data for the system;

preprocessing the plurality of service data in accordance with a user specified reliability analysis selection; and

providing an interactive graphics-based tool for performing the user specified reliability analysis on the system in accordance with the plurality of service data".

However, it is not possible to perform a reliability analysis on a system having a plurality of subsystems and a plurality of components, by storing the data, preprocessing the data and providing an interactive graphics tool alone. The method should include the steps of :

organizing the system and the plurality of subsystems and components into a hierarchical representation;

providing a plurality of options for analyzing the hierarchical representation; and

performing a reliability analysis at any level of the hierarchical representation.

Claims rejected but not specifically addressed are rejected based on their dependency on rejected claims.

### *Claim Rejections - 35 USC § 101*

11. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

12. Claims 1-18 and 25-57 are rejected under 35 U.S.C. 101 because the claimed inventions are directed to non-statutory subject matter.

12.1 Independent claim 1 recites an interactive graphics-based tool for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem. The limitations recited in claim contain a hierarchical representation component, an

interactive selection component and a reliability analysis component, which are all software components. Therefore it appears that the interactive graphics-based tool is a software tool which is not statutory subject matter. To be statutory, the interactive graphics-based tool should be a system or apparatus comprising hardware elements and software components.

The limitations recited in dependent claims 2-6 contain descriptions of the hierarchical representation component, the interactive selection component and the reliability analysis component and a visualization component which are not statutory subject matter.

12.2 Independent claim 7 recites an interactive graphics-based tool for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem. The limitations recited in claim contain a hierarchical representation component, an interactive selection component, a reliability analysis component and a visualization component, which are all software components. Therefore it appears that the interactive graphics-based tool is a software tool which is not statutory subject matter. To be statutory, the interactive graphics-based tool should be a system or apparatus comprising hardware elements and software components.

The limitations recited in dependent claims 8-11 contain descriptions of the hierarchical representation component, the interactive selection component, the reliability analysis component and the visualization component which are not statutory subject matter.

12.3 Independent claim 12 recites an interactive graphics-based tool for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components

within each subsystem. The limitations recited in claim contain a means for organizing the system and the plurality of subsystems and components into a hierarchical representation, a means for providing a plurality of options for analyzing the hierarchical representation, a means, responsive to the organizing means and the providing means, for performing a reliability analysis at any level of the hierarchical representation and a means for generating a visualization of the reliability analysis in a graphical framework, which are all software components. Therefore it appears that the interactive graphics-based tool is a software tool which is not statutory subject matter. To be statutory, the interactive graphics-based tool should be a system or apparatus comprising hardware elements and software components.

The limitations recited in dependent claims 13-15 contain descriptions of the hierarchical representation, the plurality of options, the reliability analysis means in terms of software functions which are not statutory subject matter.

12.4 Independent claim 16 recites a system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem. The limitations recited in claim contain only software components. Therefore it appears that the system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem is a software system which is not statutory subject matter. To be statutory, the system should include computer system hardware components which will be required to implement the software components.

Dependent claims 17-18 depend on Claim 16 but contain only software components which are not statutory subject matter.

12.5 Method claims 25-30 are rejected for reciting a process that is not directed to the technological arts.

Regarding claim 25, this claim is directed at a method for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem, whereas none of the limitations describe any type of computer-implemented steps. To be statutory, the utility of an invention must be within the technological arts. *In re Musgrave*, 167 USPQ 280, 289-90 (CCPA, 1970). The definition of "technology" is the "application of science and engineering to the development of machines and procedures in order to enhance or improve human conditions, or at least to improve human efficiency in some respect." (Computer Dictionary 384 (Microsoft Press, 2d ed. 1994)).

Dependent claims 26-30 depend on Claim 25 but do not add further statutory steps.

The limitations recited in claims 25-30 contain no language suggesting these claims are intended to be within the technological arts.

12.6 Method claims 31-35 are rejected for reciting a process that is not directed to the technological arts.

Regarding claim 31, this claim is directed at a method for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem, whereas none of the limitations describe any type of computer-implemented steps. To be statutory, the utility of an invention must be within the technological arts, as explained in Paragraph 12.5 above.

Dependent claims 32-35 depend on Claim 31 but do not add further statutory steps.

The limitations recited in claims 31-35 contain no language suggesting these claims are intended to be within the technological arts.

12.7 Method claims 36-38 are rejected for reciting a process that is not directed to the technological arts.

Regarding claim 36, this claim is directed at a method for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem, whereas none of the limitations describe any type of computer-implemented steps. To be statutory, the utility of an invention must be within the technological arts, as explained in Paragraph 12.5 above.

Dependent claims 37-38 depend on Claim 36 but does not add further statutory steps.

The limitations recited in claims 36-38 contain no language suggesting these claims are intended to be within the technological arts.

12.8 Method claims 39-42 are rejected for reciting a process that is not directed to the technological arts.

Regarding claim 39, this claim is directed at a method for enabling a user to perform a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem, whereas none of the limitations describe any type of computer-implemented steps. To be statutory, the utility of an invention must be within the technological arts, as explained in Paragraph 12.5 above.

Dependent claims 40-42 depend on Claim 39 but do not add further statutory steps.

The limitations recited in claims 39-42 contain no language suggesting these claims are intended to be within the technological arts.

12.9 Method claims 43-49 are rejected for reciting a process that is not directed to the technological arts.

Regarding claim 43, this claim is directed at a method for enabling a user to perform a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem, whereas none of the limitations describe any type of computer-implemented steps. To be statutory, the utility of an invention must be within the technological arts, as explained in Paragraph 12.5 above.

Dependent claims 44-49 depend on Claim 43 but do not add further statutory steps.

The limitations recited in claims 43-49 contain no language suggesting these claims are intended to be within the technological arts.

12.10 Independent claim 50 recites a computer-readable medium storing computer instructions for instructing a computer system to perform a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem. The limitations recited in claim contain computer instructions for executing various steps, which are not statutory subject matter. To be statutory, the claim should specify the computer-readable medium storing computer instructions which when executed in a computer performs a process comprising the steps included in the limitations.

The limitations recited in dependent claims 51-54 contain a computer-readable medium which is not statutory subject matter.

12.11 Independent claim 55 recites a computer-readable medium storing computer instructions for instructing a computer system to perform a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem. The limitations recited in claim contain computer instructions for executing various steps, which are not statutory subject matter. To be statutory, the claim should specify the computer-readable medium storing computer instructions which when executed in a computer performs a process comprising the steps included in the limitations.

12.12 Independent claim 56 recites a computer-readable medium storing computer instructions for instructing a computer system to perform a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem. The limitations recited in claim contain computer instructions for executing various steps, which are not statutory subject matter. To be statutory, the claim should specify the computer-readable medium storing computer instructions which when executed in a computer performs a process comprising the steps included in the limitations.

The limitations recited in dependent claim 57 contain a computer-readable medium which is not statutory subject matter.

Claims rejected but not specifically addressed are rejected based on their dependency on rejected claims.

13.1 Claims 1- 6 would be statutory if claim 1 is rewritten as an interactive graphics-based system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem, comprising:

a processor for executing instructions;

a memory for storing instructions and data;

a display device; and

an interactive graphics-based tool, comprising:

a hierarchical representation component …

13.2 Claims 7-11 would be statutory if claim 6 is rewritten as an interactive graphics-based system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem, comprising:

a processor for executing instructions;

a memory for storing instructions and data;

a display device; and

an interactive graphics-based tool, comprising:

a hierarchical representation component …

13.3 Claims 12-15 would be statutory if claim 12 is rewritten as a graphics-based system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem, comprising:

a processor for executing instructions;

a memory for storing instructions and data;

a display device; and

a graphics-based tool, comprising:

means for organizing the system and the plurality of subsystems ...

13.4 Claim 16-18 would be statutory if claim 16 is rewritten as a system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem, comprising:

a processor for executing instructions;

a memory for storing instructions and data;

a display device;

a data repository containing ...

13.5 Claim 25-30 would be statutory if claim 25 is rewritten as a computer implemented method for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem.

13.6 Claim 31-35 would be statutory if claim 31 is rewritten as a computer implemented method for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem.

13.7 Claim 36-38 would be statutory if claim 36 is rewritten as a computer implemented method for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem.

13.8 Claim 39-42 would be statutory if claim 39 is rewritten as a computer implemented method for enabling a user to perform a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem.

13.9 Claim 43-49 would be statutory if claim 43 is rewritten as a computer implemented method for enabling a user to perform a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem.

13.10 Claim 50-54 would be statutory if claim 50 is rewritten as:

A computer-readable medium storing computer instructions which when executed on a computer perform a process for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem, the computer instructions comprising instructions for:

13.11 Claim 55 would be statutory if it is rewritten as:

A computer-readable medium storing computer instructions which when executed on a computer perform a process for enabling a user to perform a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem, the computer instructions comprising instructions for:

13.12 Claim 56-57 would be statutory if claim 56 is rewritten as:

A computer-readable medium storing computer instructions which when executed on a computer perform a process for enabling a user to perform a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem, the computer instructions comprising instructions for:

## ***Claim Interpretations***

14.1 In Claim 1, "An interactive graphics-based tool for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem" has been interpreted as "An interactive graphics-based system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem".

14.2 In Claim 7, "An interactive graphics-based tool for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem"

has been interpreted as "An interactive graphics-based system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem".

14.3 In Claim 12, "A graphics-based tool for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem" has been interpreted as "A graphics-based system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem".

14.4 In Claim 16, "a statistical analysis component, responsive to the hierarchical representation component and the interactive selection component, that performs a statistical analysis at any level of the hierarchical representation; and

a visualization component that provides a visualization of the statistical analysis in a graphical framework" has been interpreted as "a reliability analysis component, responsive to the hierarchical representation component and the interactive selection component, that performs a reliability analysis at any level of the hierarchical representation; and

a visualization component that provides a visualization of the reliability analysis in a graphical framework".

14.5 In Claim 19, "an interactive graphics-based tool for performing a statistical analysis on the system in accordance with the plurality of service data, the interactive graphics based tool comprising:

a statistical analysis component, responsive to the hierarchical representation component and the interactive selection component, that performs a statistical analysis at any level of the hierarchical representation; and

a visualization component that provides a visualization of the statistical analysis in a graphical framework" has been interpreted as "an interactive graphics-based tool for performing a reliability analysis on the system in accordance with the plurality of service data, the interactive graphics based tool comprising:

a reliability analysis component, responsive to the hierarchical representation component and the interactive selection component, that performs a reliability analysis at any level of the hierarchical representation; and

a visualization component that provides a visualization of the reliability analysis in a graphical framework".

14.6 In Claim 22, "an expert system that assists the interactive graphics-based tool in performing the statistical analysis" has been interpreted as "an expert system that assists the interactive graphics-based tool in performing the reliability analysis".

## *Claim Rejections - 35 USC § 103*

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

16. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

17. Claims 1-3, 5, 7-9, 12-14, 25-27, 29, 31-33, 39-41, 50-52 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Willoughby et al.** (U.S. Patent 6,549,880) in view of **Weinstock et al.** (U.S. Patent 6,223,143).

17.1 **Willoughby et al.** teaches reliability of electrical distribution networks. Specifically, as per claim 1, **Willoughby et al.** teaches an interactive graphics-based tool for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem (Abstract, L1-5 and L9-27; Fig. 9, Item 940; Figs. 10-12I; CL1, L40-50; CL3, L33-35); comprising:

an interactive selection component that provides a plurality of options for analyzing the hierarchical representation (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50); and

a reliability analysis component, responsive to the interactive selection component, that performs a reliability analysis (Abstract, L1-5 and L9-27; CL1, 43-50; CL1, L55-57; CL2, L33-35).

**Willoughby et al.** does not expressly teach a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation. **Weinstock et al.** teaches a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Item 62; Fig. 5B, Item 531; Fig. 6; CL4, L6-8; CL7, L59 to CL8, L9; Fig. 22), because that provides a reliability and risk analysis system with an easily understood and generated hierarchical decomposition of the systems (CL2, L66-67). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the tool of **Willoughby et al.** with the tool of **Weinstock et al.** that included a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation. The artisan would have been motivated because that would provide a reliability and risk analysis system with an easily understood and generated hierarchical decomposition of the systems.

**Willoughby et al.** does not expressly teach a reliability analysis component, responsive to the hierarchical representation component that performs a reliability analysis at any level of the hierarchical representation. **Weinstock et al.** teaches a reliability analysis component, responsive to the hierarchical representation component that performs a reliability analysis at any level of the hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Fig. 5B and

Fig. 6; CL7, L59 to CL8, L9; CL10, L26-34; CL10, L45-62), because that assesses reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times (CL3, L4-7). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the tool of **Willoughby et al.** with the tool of **Weinstock et al.** that included a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation. The artisan would have been motivated because that would assess reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times.

17.2 As per claim 2, **Willoughby et al.** and **Weinstock et al.** teach the tool of claim 1. **Willoughby et al.** does not expressly teach that the hierarchical representation generated by the hierarchical representation component takes the form of a tree structure wherein the system and plurality of subsystems and components are represented in the tree structure by a node. **Weinstock et al.** teaches that the hierarchical representation generated by the hierarchical representation component takes the form of a tree structure wherein the system and plurality of subsystems and components are represented in the tree structure by a node (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Fig. 5B and Fig. 6; CL7, L59 to CL8, L9; CL10, L26-34; CL10, L45-62), because that assesses reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times (CL3, L4-7). It would have been obvious to one of

ordinary skill in the art at the time of Applicants' invention to modify the tool of **Willoughby et al.** with the tool of **Weinstock et al.** that included the hierarchical representation generated by the hierarchical representation component taking the form of a tree structure wherein the system and plurality of subsystems and components were represented in the tree structure by a node. The artisan would have been motivated because that would assess reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times.

17.3 As per claim 3, **Willoughby et al.** and **Weinstock et al.** teach the tool of claim 2. **Willoughby et al.** teaches the plurality of options provided by the interactive selection component (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50). **Willoughby et al.** does not expressly teach that the plurality of options provided by the interactive selection component comprises at least one of moving about the hierarchical representation, selecting a node and defining a group of nodes. **Weinstock et al.** teaches that the plurality of options provided by the interactive selection component comprises at least one of moving about the hierarchical representation, selecting a node and defining a group of nodes (Fig. 5C, Item 535 and 537; Fig. 6; Fig. 7; CL10, L45-62), because that assesses reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times (CL3, L4-7). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the tool of **Willoughby et al.** with the tool of **Weinstock et al.** that included the plurality of options provided by the interactive selection component comprising at least one of moving about the

hierarchical representation, selecting a node and defining a group of nodes. The artisan would have been motivated because that would assess reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times.

17.4 As per claim 5, **Willoughby et al.** and **Weinstock et al.** teach the tool of claim 1. **Willoughby et al.** teaches a visualization component that provides a visualization of the reliability analysis (Figs. 18I, 20A, 20B1 and 20B2; Fig. 22; CL2, L23-24; CL3, L14-16).

17.5 As per claim 7, it is same as claim 5, when Claim 1 limitations are read into claim 5. Therefore, **Willoughby et al.** and **Weinstock et al.** teach the tool of claim 7.

17.6 As per claim 8, **Willoughby et al.** and **Weinstock et al.** teach the tool of claim 7. **Willoughby et al.** does not expressly teach that the hierarchical representation generated by the hierarchical representation component takes the form of a tree structure wherein the system and plurality of subsystems and components are represented in the tree structure by a node. **Weinstock et al.** teaches that the hierarchical representation generated by the hierarchical representation component takes the form of a tree structure wherein the system and plurality of subsystems and components are represented in the tree structure by a node (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Fig. 5B and Fig. 6; CL7, L59 to CL8, L9; CL10, L26-34; CL10, L45-62). The motivation for combining **Willoughby et al.** and **Weinstock et al.** is presented in Paragraph 17. 2 above.

17.7 As per claim 9, **Willoughby et al.** and **Weinstock et al.** teach the tool of claim 7. **Willoughby et al.** teaches the plurality of options provided by the interactive selection component (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50). **Willoughby et al.** does not expressly teach that the plurality of options provided by the interactive selection component comprises at least one of moving about the hierarchical representation, selecting a node and defining a group of nodes. **Weinstock et al.** teaches that the plurality of options provided by the interactive selection component comprises at least one of moving about the hierarchical representation, selecting a node and defining a group of nodes (Fig. 5C, Item 535 and 537; Fig. 6; Fig. 7; CL10, L45-62). The motivation for combining **Willoughby et al.** and **Weinstock et al.** is presented in Paragraph 17. 3 above.

17.8 As per claim 12, **Willoughby et al.** teaches a graphics-based tool for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem (Abstract, L1-5 and L9-27; Fig. 9, Item 940; Figs. 10-12I; CL1, L40-50; CL3, L33-35); comprising:

means for generating a visualization of the reliability analysis in a graphical framework (Figs. 18I, 20A, 20B1 and 20B2; Fig. 22; CL2, L23-24; CL3, L14-16).

**Willoughby et al.** does not expressly teach means for organizing the system and the plurality of subsystems and components into a hierarchical representation. **Weinstock et al.** teaches means for organizing the system and the plurality of subsystems and components into a

hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Item 62; Fig. 5B, Item 531; Fig. 6; CL4, L6-8; CL7, L59 to CL8, L9; Fig. 22), because that provides a reliability and risk analysis system with an easily understood and generated hierarchical decomposition of the systems (CL2, L66-67). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the tool of **Willoughby et al.** with the tool of **Weinstock et al.** that included means for organizing the system and the plurality of subsystems and components into a hierarchical representation. The artisan would have been motivated because that would provide a reliability and risk analysis system with an easily understood and generated hierarchical decomposition of the systems.

**Willoughby et al.** does not expressly teach means for providing a plurality of options for analyzing the hierarchical representation. **Weinstock et al.** teaches means for providing a plurality of options for analyzing the hierarchical representation (Figs. 10, 12, 13, 14A, 16, 18 and 21), because that assesses reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times (CL3, L4-7). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the tool of **Willoughby et al.** with the tool of **Weinstock et al.** that included means for providing a plurality of options for analyzing the hierarchical representation. The artisan would have been motivated because that would assess reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times.

**Willoughby et al.** does not expressly teach means, responsive to the organizing means and the providing means, for performing a reliability analysis at any level of the hierarchical representation. **Weinstock et al.** teaches means, responsive to the organizing means and the providing means, for performing a reliability analysis at any level of the hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Fig. 5B and Fig. 6; CL7, L59 to CL8, L9; CL10, L26-34; CL10, L45-62), because that assesses reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times (CL3, L4-7). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the tool of **Willoughby et al.** with the tool of **Weinstock et al.** that included means, responsive to the organizing means and the providing means, for performing a reliability analysis at any level of the hierarchical representation. The artisan would have been motivated because that would assess reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times.

17.9 As per claim 13, **Willoughby et al.** and **Weinstock et al.** teach the tool of claim 12. **Willoughby et al.** does not expressly teach that the hierarchical representation generated by the organizing means takes the form of a tree structure wherein the system and plurality of subsystems and components are represented in the tree structure by a node. **Weinstock et al.** teaches that the hierarchical representation generated by the organizing means takes the form of a tree structure wherein the system and plurality of subsystems and components are represented in

the tree structure by a node (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Fig. 5B and Fig. 6; CL7, L59 to CL8, L9; CL10, L26-34; CL10, L45-62). The motivation for combining **Willoughby et al.** and **Weinstock et al.** is presented in Paragraph 17. 2 above.

17.10 As per claim 9, **Willoughby et al.** and **Weinstock et al.** teach the tool of claim 7. **Willoughby et al.** teaches the plurality of options provided by the providing means (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50). **Willoughby et al.** does not expressly teach that the plurality of options provided by the providing means comprises at least one of moving about the hierarchical representation, selecting a node and defining a group of nodes. **Weinstock et al.** teaches that the plurality of options provided by the providing means comprises at least one of moving about the hierarchical representation, selecting a node and defining a group of nodes (Fig. 5C, Item 535 and 537; Fig. 6; Fig. 7; CL10, L45-62). The motivation for combining **Willoughby et al.** and **Weinstock et al.** is presented in Paragraph 17. 3 above.

17.11 As per Claims 25-27, 29 and 31-33, these are rejected based on the same reasoning as Claims 1-3, 5 and 7-9 supra. Claims 25-27, 29 and 31-33 are method claims reciting the same limitations as Claims 1-3, 5 and 7-9, as taught throughout by **Willoughby et al.** and **Weinstock et al.**

17.12 As per claim 39, **Willoughby et al.** teaches a method for enabling a user to perform a reliability analysis on a system having a plurality of subsystems and a plurality of components

within each subsystem (Abstract, L1-5 and L9-27; Fig. 9, Item 940; Figs. 10-12I; CL1, L40-50; CL3, L33-35); comprising:

prompting the user to select from a plurality of analyzing options (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50);

in response to the user selection, performing a reliability analysis (Abstract, L1-5 and L9-27; CL1, 43-50; CL1, L55-57; CL2, L33-35) and

providing a visualization of the reliability analysis to the user in a graphical framework (Figs. 18I, 20A, 20B1 and 20B2; Fig. 22; CL2, L23-24; CL3, L14-16).

**Willoughby et al.** does not expressly teach prompting the user to organize the system and the plurality of subsystems and components into a hierarchical representation. **Weinstock et al.** teaches prompting the user to organize the system and the plurality of subsystems and components into a hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Item 62; Fig. 5B, Item 531; Fig. 6; CL4, L6-8; CL7, L59 to CL8, L9; Fig. 22), because that provides a reliability and risk analysis system with an easily understood and generated hierarchical decomposition of the systems (CL2, L66-67). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Willoughby et al.** with the method of **Weinstock et al.** that included prompting the user to organize the system and the plurality of subsystems and components into a hierarchical representation. The artisan would have been motivated because that would provide a reliability and risk analysis system with an easily understood and generated hierarchical decomposition of the systems.

**Willoughby et al.** does not expressly teach in response to the user selection, performing a reliability analysis at any level of the hierarchical representation. **Weinstock et al.** teaches in response to the user selection, performing a reliability analysis at any level of the hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Fig. 5B and Fig. 6; CL7, L59 to CL8, L9; CL10, L26-34; CL10, L45-62), because that assesses reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times (CL3, L4-7). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Willoughby et al.** with the method of **Weinstock et al.** that included in response to the user selection, performing a reliability analysis at any level of the hierarchical representation. The artisan would have been motivated because that would assess reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times.

17.13 As per claim 40, **Willoughby et al.** and **Weinstock et al.** teach the method of claim 39. **Willoughby et al.** does not expressly teach that the hierarchical representation takes the form of a tree structure wherein the system and plurality of subsystems and components are represented in the tree structure by a node. **Weinstock et al.** teaches that the hierarchical representation takes the form of a tree structure wherein the system and plurality of subsystems and components are represented in the tree structure by a node (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Fig. 5B and Fig. 6; CL7, L59 to CL8, L9; CL10, L26-34; CL10, L45-62), because that assesses

reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times (CL3, L4-7). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Willoughby et al.** with the method of **Weinstock et al.** that included the hierarchical representation taking the form of a tree structure wherein the system and plurality of subsystems and components were represented in the tree structure by a node. The artisan would have been motivated because that would assess reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times.

17.14 As per claim 41, **Willoughby et al.** and **Weinstock et al.** teach the method of claim 40. **Willoughby et al.** teaches the plurality of options provided by the interactive selection component (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50). **Willoughby et al.** does not expressly teach that the plurality of options provided by the interactive selection component comprises at least one of moving about the hierarchical representation, selecting a node and defining a group of nodes. **Weinstock et al.** teaches that the plurality of options provided by the interactive selection component comprises at least one of moving about the hierarchical representation, selecting a node and defining a group of nodes (Fig. 5C, Item 535 and 537; Fig. 6; Fig. 7; CL10, L45-62), because that assesses reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times (CL3, L4-7). It would have

been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Willoughby et al.** with the method of **Weinstock et al.** that included the plurality of options provided by the interactive selection component comprising at least one of moving about the hierarchical representation, selecting a node and defining a group of nodes. The artisan would have been motivated because that would assess reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times.

17.15 As per Claims 50-52 and 55 these are rejected based on the same reasoning as Claims 31-33 and 39, <u>supra.</u> Claims 50-52 and 55 are computer-readable medium claims reciting the same limitations as Claims 31-33 and 39, as taught throughout by **Willoughby et al.** and **Weinstock et al.**

18. Claims 4, 10, 15, 19-22, 24, 28, 34, 42 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Willoughby et al.** (U.S. Patent 6,549,880) in view of **Weinstock et al.** (U.S. Patent 6,223,143), and further in view of **Spira et al.** (U.S. Patent Application 2003/0172002).

18.1 As per claim 3, **Willoughby et al.** and **Weinstock et al.** teach the tool of claim 1. **Willoughby et al.** teaches that the reliability analysis component performs at least one of a reliability prediction (CL1, L45-47; Abstract, L1-5 and L18-20; CL1, L55-57; CL3, L33-35).

**Willoughby et al.** does not expressly teach that the reliability analysis component performs at least one of a statistical analysis. **Weinstock et al.** teaches that the reliability analysis component performs at least one of a statistical analysis (CL2, L2-9), because that allows time based quantification of failure modes, such as uncertainty distribution and probability as a function of variables (CL2, L3-4). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the tool of **Willoughby et al.** with the tool of **Weinstock et al.** that included the reliability analysis component performing at least one of a statistical analysis. The artisan would have been motivated because that would allow time based quantification of failure modes, such as uncertainty distribution and probability as a function of variables.

**Willoughby et al.** does not expressly teach that the reliability analysis component performs at least one of a life cycle cost analysis. **Spira et al.** teaches that the reliability analysis component performs at least one of a life cycle cost analysis (Page 2, Para 0031; Page 2, Para 0032), because that enhances the system owner's financial system results (profit) and lowers the cost over the life time of the system, through a proactive based maintenance approach (Page 2, Para 0031; Page 2, Para 0032). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the tool of **Willoughby et al.** with the tool of **Spira et al.** that included the reliability analysis component performing at least one of a life cycle cost analysis. The artisan would have been motivated because that would enhance the system owner's financial system results (profit) and lowers the cost over the life time of the system, through a proactive based maintenance approach.

**Willoughby et al.** does not expressly teach that the reliability analysis component performs at least one of a maintenance projection. **Spira et al.** teaches that the reliability analysis component performs at least one of a maintenance projection (Fig. 12, Items 504 and 506; Fig. 18; Page 1, Para 0001; Page 10, Para 0137), because that allows establishing a maintenance plan, a failure mode and effects analysis and reliability centered maintenance (Page 8, Para 0112). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the tool of **Willoughby et al.** with the tool of **Spira et al.** that included the reliability analysis component performing at least one of a maintenance projection. The artisan would have been motivated because that would allow establishing a maintenance plan, a failure mode and effects analysis and reliability centered maintenance.

**Willoughby et al.** does not expressly teach that the reliability analysis component performs at least one of a inventory forecasting. **Spira et al.** teaches that the reliability analysis component performs at least one of a inventory forecasting (Fig. 17, Item 106; Page 10, Para 0134), because the inventory forecasting provides opportunities for inventory optimization and reduction (Page 10, Para 0134); and opportunities to reduce costs over life time of the system (Page 4, Para 0048). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the tool of **Willoughby et al.** with the tool of **Spira et al.** that included the reliability analysis component performing at least one of a inventory forecasting. The artisan would have been motivated because the inventory forecasting would provide opportunities for inventory optimization and reduction; and opportunities to reduce costs over life time of the system.

18.2 As per claim 10, **Willoughby et al.** and **Weinstock et al.** teach the tool of claim 7. **Willoughby et al.** teaches that the reliability analysis component performs at least one of a reliability prediction (CL1, L45-47; Abstract, L1-5 and L18-20; CL1, L55-57; CL3, L33-35). **Willoughby et al.** does not expressly teach that the reliability analysis component performs at least one of a statistical analysis. **Weinstock et al.** teaches that the reliability analysis component performs at least one of a statistical analysis (CL2, L2-9), because that allows time based quantification of failure modes, such as uncertainty distribution and probability as a function of variables (CL2, L3-4). The motivation for combining **Willoughby et al.** and **Weinstock et al.** is presented in Paragraph 18.1 above.

**Willoughby et al.** does not expressly teach that the reliability analysis component performs at least one of a life cycle cost analysis. **Spira et al.** teaches that the reliability analysis component performs at least one of a life cycle cost analysis (Page 2, Para 0031; Page 2, Para 0032), because that enhances the system owner's financial system results (profit) and lowers the cost over the life time of the system, through a proactive based maintenance approach (Page 2, Para 0031; Page 2, Para 0032). The motivation for combining **Willoughby et al.** and **Spira et al.** is presented in Paragraph 18.1 above.

**Willoughby et al.** does not expressly teach that the reliability analysis component performs at least one of a maintenance projection. **Spira et al.** teaches that the reliability analysis component performs at least one of a maintenance projection (Fig. 12, Items 504 and 506; Fig. 18; Page 1, Para 0001; Page 10, Para 0137), because that allows establishing a maintenance plan, a failure mode and effects analysis and reliability centered maintenance (Page

8, Para 0112). The motivation for combining **Willoughby et al.** and **Spira et al.** is presented in Paragraph 18.1 above.

**Willoughby et al.** does not expressly teach that the reliability analysis component performs at least one of a inventory forecasting. **Spira et al.** teaches that the reliability analysis component performs at least one of a inventory forecasting (Fig. 17, Item 106; Page 10, Para 0134), because the inventory forecasting provides opportunities for inventory optimization and reduction (Page 10, Para 0134); and opportunities to reduce costs over life time of the system (Page 4, Para 0048). The motivation for combining **Willoughby et al.** and **Spira et al.** is presented in Paragraph 18.1 above.

18.3 As per claim 15, **Willoughby et al.** and **Weinstock et al.** teach the tool of claim 12. **Willoughby et al.** teaches that the reliability analysis means performs at least one of a reliability prediction (CL1, L45-47; Abstract, L1-5 and L18-20; CL1, L55-57; CL3, L33-35). **Willoughby et al.** does not expressly teach that the reliability analysis means performs at least one of a statistical analysis. **Weinstock et al.** teaches that the reliability analysis means performs at least one of a statistical analysis (CL2, L2-9), because that allows time based quantification of failure modes, such as uncertainty distribution and probability as a function of variables (CL2, L3-4). The motivation for combining **Willoughby et al.** and **Weinstock et al.** is presented in Paragraph 18.1 above.

**Willoughby et al.** does not expressly teach that the reliability analysis means performs at least one of a life cycle cost analysis. **Spira et al.** teaches that the reliability analysis means performs at least one of a life cycle cost analysis (Page 2, Para 0031; Page 2, Para 0032), because

that enhances the system owner's financial system results (profit) and lowers the cost over the life time of the system, through a proactive based maintenance approach (Page 2, Para 0031; Page 2, Para 0032). The motivation for combining **Willoughby et al.** and **Spira et al.** is presented in Paragraph 18.1 above.

**Willoughby et al.** does not expressly teach that the reliability analysis means performs at least one of a maintenance projection. **Spira et al.** teaches that the reliability analysis means performs at least one of a maintenance projection (Fig. 12, Items 504 and 506; Fig. 18; Page 1, Para 0001; Page 10, Para 0137), because that allows establishing a maintenance plan, a failure mode and effects analysis and reliability centered maintenance (Page 8, Para 0112). The motivation for combining **Willoughby et al.** and **Spira et al.** is presented in Paragraph 18.1 above.

**Willoughby et al.** does not expressly teach that the reliability analysis means performs at least one of a inventory forecasting. **Spira et al.** teaches that the reliability analysis means performs at least one of a inventory forecasting (Fig. 17, Item 106; Page 10, Para 0134), because the inventory forecasting provides opportunities for inventory optimization and reduction (Page 10, Para 0134); and opportunities to reduce costs over life time of the system (Page 4, Para 0048). The motivation for combining **Willoughby et al.** and **Spira et al.** is presented in Paragraph 18.1 above.

18.4 As per claim 19, **Willoughby et al.** teaches a system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each

subsystem (Abstract, L1-5 and L9-27; Fig. 9, Item 940; Figs. 10-12I; CL1, L40-50; CL3, L33-35); comprising:

an interactive graphics-based tool for performing a reliability analysis on the system in accordance with the plurality of service data (Abstract, L1-5 and L9-27; Fig. 9, Item 940; Figs. 10-12I; CL1, L40-50; CL3, L33-35); the interactive graphics-based tool comprising:

an interactive selection component that provides a plurality of options for analyzing the hierarchical representation (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50);

a reliability analysis component, responsive to the interactive selection component, that performs a reliability analysis (Abstract, L1-5 and L9-27; CL1, 43-50; CL1, L55-57; CL2, L33-35);

a visualization component that provides a visualization of the reliability analysis in a graphical framework (Figs. 18I, 20A, 20B1 and 20B2; Fig. 22; CL2, L23-24; CL3, L14-16); and

a first computing unit configured to serve the data repository and the interactive graphics-based tool (Fig. 8; Fig. 9, Item s 940 and 855).

**Willoughby et al.** does not expressly teach a data repository containing a plurality of service data for the system. **Spira et al.** teaches a data repository containing a plurality of service data for the system (Page 2, Para 0021), because the knowledge base forms a system maintenance repository of historical data that could be used for prediction of system events, system and component failure modes and events (Page 2, Para 0021). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al.** with the system of **Spira et al.** that included a data repository

containing a plurality of service data for the system. The artisan would have been motivated because the knowledge base would form a system maintenance repository of historical data that could be used for prediction of system events, system and component failure modes and events.

**Willoughby et al.** does not expressly teach a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation. **Weinstock et al.** teaches a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Item 62; Fig. 5B, Item 531; Fig. 6; CL4, L6-8; CL7, L59 to CL8, L9; Fig. 22), because that provides a reliability and risk analysis system with an easily understood and generated hierarchical decomposition of the systems (CL2, L66-67). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al.** with the system of **Weinstock et al.** that included a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation. The artisan would have been motivated because that would provide a reliability and risk analysis system with an easily understood and generated hierarchical decomposition of the systems.

**Willoughby et al.** does not expressly teach a reliability analysis component, responsive to the hierarchical representation component that performs a reliability analysis at any level of the hierarchical representation. **Weinstock et al.** teaches a reliability analysis component, responsive to the hierarchical representation component that performs a reliability analysis at any level of the hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Fig. 5B and Fig. 6; CL7, L59 to CL8, L9; CL10, L26-34; CL10, L45-62), because that assesses reliability

and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times (CL3, L4-7). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al.** with the system of **Weinstock et al.** that included a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation. The artisan would have been motivated because that would assess reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times.

18.5 As per claim 20, **Willoughby et al., Weinstock et al.** and **Spira et al.** teach the system of claim 19. **Willoughby et al.** does not expressly teach that the data repository stores historical failure data for the system. **Spira et al.** teaches that the data repository stores historical failure data for the system (Page 2, Para 0021), because the knowledge base forms a system maintenance repository of historical data that could be used for prediction of system events, system and component failure modes and events (Page 2, Para 0021). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al.** with the system of **Spira et al.** that included the data repository storing historical failure data for the system. The artisan would have been motivated because the knowledge base would form a system maintenance repository of historical data that could be used for prediction of system events, system and component failure modes and events.

18.6 As per claim 21, **Willoughby et al., Weinstock et al.** and **Spira et al.** teach the system of claim 19. **Willoughby et al.** does not expressly teach a simulator that simulates the reliability of the plurality of service data in accordance with the statistical model. **Weinstock et al.** teaches a simulator that simulates the reliability of the plurality of service data in accordance with the statistical model (Fig. 5C; CL2, L2-9; Fig. 16; CL16, L44-59; CL18, L37-59), because that allows various probability distributions to be run at the selected hierarchical level and the risks ranked by the failure modes, subsystems and failure scenarios (CL17, L14-15 and L9-10). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al.** with the system of **Weinstock et al.** that included a simulator that simulates the reliability of the plurality of service data in accordance with the statistical model. The artisan would have been motivated because that would assess reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times.

18.7 As per claim 22, **Willoughby et al., Weinstock et al.** and **Spira et al.** teach the system of claim 19. **Willoughby et al.** teaches an expert system that assists the interactive graphics-based tool in performing the reliability analysis (Fig. 9, Item 850; CL2, L40-45; Cl14, L37-43; CL15, L14-22).

18.8 As per claim 24, **Willoughby et al., Weinstock et al.** and **Spira et al.** teach the system of claim 19. **Willoughby et al.** does not expressly teach a second computing unit configured to

interact with the data repository and the interactive graphics-based tool served from the first computing unit over a network. **Spira et al.** teaches a second computing unit configured to interact with the data repository and the interactive graphics-based tool served from the first computing unit over a network (Page 2, Para 0021; Page 3, Para 0037; Fig. 2; Page 3, Para 0038; Page 9, Para 0117), because that allows standard organization software like Computerized Maintenance Management System (CMMS) to be employed over the internet (Page 3, Para 0038). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al.** with the system of **Spira et al.** that included a second computing unit configured to interact with the data repository and the interactive graphics-based tool served from the first computing unit over a network. The artisan would have been motivated because that would allow standard organization software like Computerized Maintenance Management System (CMMS) to be employed over the internet.

18.9 As per Claims 28, 34 and 42, these are rejected based on the same reasoning as Claims 4, 10 and 10, supra. Claims 28, 34 and 42 are method claims reciting the same limitations as Claims 4, 10 and 10, as taught throughout by **Willoughby et al., Weinstock et al.** and **Spira et al.**

18.10 As per Claim 53 it is rejected based on the same reasoning as Claim 4, supra. Claim 53 is a computer-readable medium claim reciting the same limitations as Claims 4, as taught throughout by **Willoughby et al., Weinstock et al.** and **Spira et al.**

19. Claims 16, 17, 23, 38, 44-49 and 57 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Willoughby et al.** (U.S. Patent 6,549,880) in view of **Weinstock et al.** (U.S. Patent 6,223,143), and further in view of **Spira et al.** (U.S. Patent Application 2003/0172002) and **Wegerich et al.** (U.S. Patent Application 2002/0183971).

19.1 As per claim 16, **Willoughby et al.** teaches a system for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem (Abstract, L1-5 and L9-27; Fig. 9, Item 940; Figs. 10-12I; CL1, L40-50; CL3, L33-35); comprising:

an interactive graphics-based tool for performing the user specified reliability analysis on the system in accordance with the plurality of service data (Abstract, L1-5 and L9-27; Fig. 9, Item 940; Figs. 10-12I; CL1, L40-50; CL3, L33-35); the interactive graphics-based tool comprising:

an interactive selection component that provides a plurality of options for analyzing the hierarchical representation (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50);

a reliability analysis component, responsive to the interactive selection component, that performs a reliability analysis (Abstract, L1-5 and L9-27; CL1, 43-50; CL1, L55-57; CL2, L33-35); and

a visualization component that provides a visualization of the reliability analysis in a graphical framework (Figs. 18I, 20A, 20B1 and 20B2; Fig. 22; CL2, L23-24; CL3, L14-16).

**Willoughby et al.** does not expressly teach a data repository containing a plurality of service data for the system. **Spira et al.** teaches a data repository containing a plurality of service data for the system (Page 2, Para 0021), because the knowledge base forms a system maintenance repository of historical data that could be used for prediction of system events, system and component failure modes and events (Page 2, Para 0021). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al.** with the system of **Spira et al.** that included a data repository containing a plurality of service data for the system. The artisan would have been motivated because the knowledge base would form a system maintenance repository of historical data that could be used for prediction of system events, system and component failure modes and events.

**Willoughby et al.** teaches a user specified reliability analysis selection (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50). **Willoughby et al.** does not expressly teach an interactive data preprocessor that preprocesses the plurality of service data in accordance with a user specified reliability analysis selection. **Wegerich et al.** teaches an interactive data preprocessor that preprocesses the plurality of service data in accordance with a user specified reliability analysis selection (Fig. 1, Item 110; Page 2, Para 0033 ; Page 3, Para 0034), because that allows using historical service data to learn normal states of operation and use the data for diagnostics (Page 3, Para 0037 and Page 6, Para 0062). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al.** with the system of **Wegerich et al.** that included an interactive data preprocessor that preprocesses the plurality of service data in accordance with a user specified reliability analysis selection. The

artisan would have been motivated because that would allow using historical service data to learn normal states of operation and use the data for diagnostics.

**Willoughby et al.** does not expressly teach a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation. **Weinstock et al.** teaches a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Item 62; Fig. 5B, Item 531; Fig. 6; CL4, L6-8; CL7, L59 to CL8, L9; Fig. 22), because that provides a reliability and risk analysis system with an easily understood and generated hierarchical decomposition of the systems (CL2, L66-67). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al.** with the system of **Weinstock et al.** that included a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation. The artisan would have been motivated because that would provide a reliability and risk analysis system with an easily understood and generated hierarchical decomposition of the systems.

**Willoughby et al.** does not expressly teach a reliability analysis component, responsive to the hierarchical representation component that performs a reliability analysis at any level of the hierarchical representation. **Weinstock et al.** teaches a reliability analysis component, responsive to the hierarchical representation component that performs a reliability analysis at any level of the hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Fig. 5B and Fig. 6; CL7, L59 to CL8, L9; CL10, L26-34; CL10, L45-62), because that assesses reliability and risk at failure mode, system, subsystem and element levels based on historical and user

supplied quantifications of failure modes, event sequences, system decomposition and operating times (CL3, L4-7). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al.** with the system of **Weinstock et al.** that included a hierarchical representation component that organizes the system and the plurality of subsystems and components into a hierarchical representation. The artisan would have been motivated because that would assess reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times.

19.2 As per claim 17, **Willoughby et al., Weinstock et al. Spira et al.** and **Wegerich et al.** teach the system of claim 16. **Willoughby et al.** teaches an expert system that assists the interactive graphics-based tool in performing the reliability analysis (Fig. 9, Item 850; CL2, L40-45; Cl14, L37-43; CL15, L14-22).

19.3 As per claim 23, **Willoughby et al., Weinstock et al.** and **Spira et al.** teach the system of claim 19. **Willoughby et al.** does not expressly teach a data preprocessor that preprocesses the plurality of service data. **Wegerich et al.** teaches a data preprocessor that preprocesses the plurality of service data (Fig. 1, Item 110; Page 2, Para 0033; Page 3, Para 0034), because that allows using historical service data to learn normal states of operation and use the data for diagnostics (Page 3, Para 0037 and Page 6, Para 0062). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al.** with the system of **Wegerich et al.** that included a data preprocessor that preprocesses the

plurality of service data. The artisan would have been motivated because that would allow using historical service data to learn normal states of operation and use the data for diagnostics.

19.4 As per claim 38, **Willoughby et al., Spira et al.** and **Wegerich et al.** teach the method of claim 36. **Willoughby et al.** does not expressly teach simulating the reliability of the plurality of service data in accordance with the statistical model. **Weinstock et al.** teaches simulating the reliability of the plurality of service data in accordance with the statistical model (Fig. 5C; CL2, L2-9; Fig. 16; CL16, L44-59; CL18, L37-59), because that allows various probability distributions to be run at the selected hierarchical level and the risks ranked by the failure modes, subsystems and failure scenarios (CL17, L14-15 and L9-10). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Willoughby et al.** with the method of **Weinstock et al.** that included simulating the reliability of the plurality of service data in accordance with the statistical model. The artisan would have been motivated because that would assess reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times.

**Willoughby et al.** does not expressly teach predicting life cycle events and costs associated with each event. **Spira et al.** teaches predicting life cycle events and costs associated with each event (Page 2, Para 0031; Page 2, Para 0032), because that enhances the system owner's financial system results (profit) and lowers the cost over the life time of the system, through a proactive based maintenance approach (Page 2, Para 0031; Page 2, Para 0032). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to

modify the method of **Willoughby et al.** with the method of **Weinstock et al.** and **Spira et al.** that included simulating predicting life cycle events and costs associated with each event. The artisan would have been motivated because that would enhance the system owner's financial system results (profit) and lowers the cost over the life time of the system, through a proactive based maintenance approach.

19.5 . As per claim 44, **Willoughby et al., Spira et al.** and **Wegerich et al.** teach the method of claim 43. **Willoughby et al.** does not expressly teach that the performing of the user specified reliability analysis comprises prompting the user to organize the system and the plurality of subsystems and components into a hierarchical representation. **Weinstock et al.** teaches that the performing of the user specified reliability analysis comprises prompting the user to organize the system and the plurality of subsystems and components into a hierarchical representation (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Item 62; Fig. 5B, Item 531; Fig. 6; CL4, L6-8; CL7, L59 to CL8, L9; Fig. 22), because that provides a reliability and risk analysis system with an easily understood and generated hierarchical decomposition of the systems (CL2, L66-67). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Willoughby et al.** with the method of **Weinstock et al.** that included the performing of the user specified reliability analysis comprising prompting the user to organize the system and the plurality of subsystems and components into a hierarchical representation. The artisan would have been motivated because that would provide a reliability and risk analysis system with an easily understood and generated hierarchical decomposition of the systems.

19.6 As per claim 45, **Willoughby et al., Weinstock et al., Spira et al.** and **Wegerich et al.** teach the method of claim 44. **Willoughby et al.** teaches that the performing of the user specified reliability analysis comprises prompting the user to select from a plurality of analyzing options (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50).

19.7 As per claim 46, **Willoughby et al., Weinstock et al., Spira et al.** and **Wegerich et al.** teach the method of claim 45. **Willoughby et al.** does not expressly teach that the performing of the user specified reliability analysis comprises performing a reliability analysis at any level of the hierarchical representation in response to the user selection. **Weinstock et al.** teaches that the performing of the user specified reliability analysis comprises performing a reliability analysis at any level of the hierarchical representation in response to the user selection. (Abstract, L1-2, L8-10 and L13-17; Fig. 5A, Fig. 5B and Fig. 6; CL7, L59 to CL8, L9; CL10, L26-34; CL10, L45-62), because that assesses reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times (CL3, L4-7). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Willoughby et al.** with the method of **Weinstock et al.** that included the performing of the user specified reliability analysis comprising performing a reliability analysis at any level of the hierarchical representation in response to the user selection.. The artisan would have been motivated because that would assess reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times.

19.8 As per claim 47, **Willoughby et al., Weinstock et al., Spira et al.** and **Wegerich et al.** teach the method of claim 46. **Willoughby et al.** teaches that the performing of the user specified reliability analysis comprises providing a visualization of the reliability analysis to the user (Figs. 18I, 20A, 20B1 and 20B2; Fig. 22; CL2, L23-24; CL3, L14-16).

19.9 As per claim 48, **Willoughby et al., Spira et al.** and **Wegerich et al.** teach the method of claim 43. **Willoughby et al.** does not expressly teach performing a simulation of the reliability of the plurality of service data in accordance with the statistical model. **Weinstock et al.** teaches performing a simulation of the reliability of the plurality of service data in accordance with the statistical model (Fig. 5C; CL2, L2-9; Fig. 16; CL16, L44-59; CL18, L37-59), because that allows various probability distributions to be run at the selected hierarchical level and the risks ranked by the failure modes, subsystems and failure scenarios (CL17, L14-15 and L9-10). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Willoughby et al.** with the method of **Weinstock et al.** that included a performing a simulation of the reliability of the plurality of service data in accordance with the statistical model. The artisan would have been motivated because that would assess reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times.

19.10 As per claim 49, **Willoughby et al., Weinstock et al. Spira et al.** and **Wegerich et al.** teach the method of claim 36. **Willoughby et al.** does not expressly teach simulating the reliability of the plurality of service data in accordance with the statistical model. **Weinstock et al.** teaches simulating the reliability of the plurality of service data in accordance with the statistical model (Fig. 5C; CL2, L2-9; Fig. 16; CL16, L44-59; CL18, L37-59), because that allows various probability distributions to be run at the selected hierarchical level and the risks ranked by the failure modes, subsystems and failure scenarios (CL17, L14-15 and L9-10). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Willoughby et al.** with the method of **Weinstock et al.** that included simulating the reliability of the plurality of service data in accordance with the statistical model. The artisan would have been motivated because that would assess reliability and risk at failure mode, system, subsystem and element levels based on historical and user supplied quantifications of failure modes, event sequences, system decomposition and operating times.

**Willoughby et al.** does not expressly teach predicting life cycle events and costs associated with each event. **Spira et al.** teaches predicting life cycle events and costs associated with each event (Page 2, Para 0031; Page 2, Para 0032), because that enhances the system owner's financial system results (profit) and lowers the cost over the life time of the system, through a proactive based maintenance approach (Page 2, Para 0031; Page 2, Para 0032). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Willoughby et al.** with the method of **Weinstock et al.** and **Spira et al.** that included simulating predicting life cycle events and costs associated with each event. The artisan would have been motivated because that would enhance the system owner's financial

system results (profit) and lowers the cost over the life time of the system, through a proactive based maintenance approach.

19.11 As per Claim 57, it is rejected based on the same reasoning as Claim 48, supra. Claim 57 is a computer-readable medium claim reciting the same limitations as Claims 48, as taught throughout by **Willoughby et al., Weinstock et al., Spira et al.** and **Wegerich et al.**

20. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Willoughby et al.** (U.S. Patent 6,549,880) in view of **Weinstock et al.** (U.S. Patent 6,223,143), and further in view of **Spira et al.** (U.S. Patent Application 2003/0172002), **Wegerich et al.** (U.S. Patent Application 2002/0183971), **Gross et al.** (U.S. Patent 5,774,379) and **Cook** (U.S. Patent 6,546,378).

20.1 As per claim 18, **Willoughby et al., Weinstock et al. Spira et al.** and **Wegerich et al.** teach the system of claim 16. **Willoughby et al.** does not expressly teach that the data preprocessor performs at least one of determining censoring times, filtering data and segmenting data. **Gross et al.** that the data preprocessor performs at least one of determining censoring times and filtering data (CL10, L46-51), because that that allows sensing slow degradation that occurs over a long period in the presence of noisy background (C103, L56-65). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al.** with the system of **Gross et al.** that included the data preprocessor performing at least one of determining censoring times and filtering data. The artisan would

have been motivated because that would that sensing slow degradation that occurred over a long period in the presence of noisy background.

**Willoughby et al.** does not expressly teach that the data preprocessor performs at least one of determining censoring times and segmenting data. **Cook** teaches that the data preprocessor performs at least one of determining censoring times and segmenting data (CL7, L10-13), because predictions can be made from interpretation of data segments (CL9, L63-65); and data segments can be used with classification modules to generate classifications (CL7, L10-13). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the system of **Willoughby et al.** with the system of **Cook** that included the data preprocessor performing at least one of determining censoring times and segmenting data. The artisan would have been motivated because predictions could be made from interpretation of data segments; and data segments could be used with classification modules to generate classifications.

21. Claims 36, 43 and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Willoughby et al.** (U.S. Patent 6,549,880) in view of **Weinstock et al.** (U.S. Patent 6,223,143), and further in view of **Wegerich et al.** (U.S. Patent Application 2002/0183971).

21.1 As per claim 36, **Willoughby et al.** teaches method for performing a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem (Abstract, L1-5 and L9-27; Fig. 9, Item 940; Figs. 10-12I; CL1, L40-50; CL3, L33-35); comprising:

providing an interactive graphics-based tool for performing the user specified reliability analysis on the system in accordance with the plurality of service data (Abstract, L1-5 and L9-27; Fig. 12E; CL1, L40-50; CL1, L55-57; CL2, L33-35).

**Willoughby et al.** does not expressly teach storing a plurality of service data for the system. **Spira et al.** teaches storing a plurality of service data for the system (Page 2, Para 0021), because the knowledge base forms a system maintenance repository of historical data that could be used for prediction of system events, system and component failure modes and events (Page 2, Para 0021). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Willoughby et al.** with the method of **Spira et al.** that included storing a plurality of service data for the system. The artisan would have been motivated because the knowledge base would form a system maintenance repository of historical data that could be used for prediction of system events, system and component failure modes and events.

**Willoughby et al.** does not expressly teach preprocessing the plurality of service data in accordance with a user specified reliability analysis selection. **Wegerich et al.** teaches preprocessing the plurality of service data in accordance with a user specified reliability analysis selection (Fig. 1, Item 110; Page 2, Para 0033 ; Page 3, Para 0034), because that allows using historical service data to learn normal states of operation and use the data for diagnostics (Page 3, Para 0037 and Page 6, Para 0062). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Willoughby et al.** with the method of **Wegerich et al.** that included preprocessing the plurality of service data in accordance

with a user specified reliability analysis selection. The artisan would have been motivated because that would allow using historical service data to learn normal states of operation and use the data for diagnostics.

21.2 As per claim 43, **Willoughby et al.** teaches a method for enabling a user to perform a reliability analysis on a system having a plurality of subsystems and a plurality of components within each subsystem (Abstract, L1-5 and L9-27; Fig. 9, Item 940; Figs. 10-12I; CL1, L40-50; CL3, L33-35); comprising:

prompting the user to specify a reliability analysis selection (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50);

performing the user specified reliability analysis (Abstract, L1-5 and L9-27; CL1, 43-50; CL1, L55-57; CL2, L33-35).

**Willoughby et al.** does not expressly teach storing a plurality of service data for the system. **Spira et al.** teaches storing a plurality of service data for the system (Page 2, Para 0021), because the knowledge base forms a system maintenance repository of historical data that could be used for prediction of system events, system and component failure modes and events (Page 2, Para 0021). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Willoughby et al.** with the method of **Spira et al.** that included storing a plurality of service data for the system. The artisan would have been motivated because the knowledge base would form a system maintenance repository of historical

data that could be used for prediction of system events, system and component failure modes and events.

**Willoughby et al.** teaches a user specified reliability analysis selection (Abstract, L9-17 and L20-23; Fig. 12E; CL1, L40-50). **Willoughby et al.** does not expressly teach preprocessing the plurality of service data in accordance with the user specified reliability analysis selection. **Wegerich et al.** teaches preprocessing the plurality of service data in accordance with the user specified reliability analysis selection (Fig. 1, Item 110; Page 2, Para 0033 ; Page 3, Para 0034), because that allows using historical service data to learn normal states of operation and use the data for diagnostics (Page 3, Para 0037 and Page 6, Para 0062). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Willoughby et al.** with the method of **Wegerich et al.** that included preprocessing the plurality of service data in accordance with the user specified reliability analysis selection. The artisan would have been motivated because that would allow using historical service data to learn normal states of operation and use the data for diagnostics.

21.3 As per Claim 56, it is rejected based on the same reasoning as Claim 43, <u>supra.</u> Claim 56 is a computer-readable medium claim reciting the same limitations as Claims 43, as taught throughout by **Willoughby et al., Wegerich et al.** and **Spira et al.**

22. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Willoughby et al.** (U.S. Patent 6,549,880) in view of **Spira et al.** (U.S. Patent Application 2003/0172002), and

further in view of **Wegerich et al.** (U.S. Patent Application 2002/0183971), **Gross et al.** (U.S. Patent 5,774,379) and **Cook** (U.S. Patent 6,546,378).

22.1 As per claim 37, **Willoughby et al., Spira et al.** and **Wegerich et al.** teach the method of claim 36. **Willoughby et al.** does not expressly teach that the preprocessing comprises performing at least one of determining censoring times, filtering data and segmenting data. **Gross et al.** that the preprocessing comprises performing at least one of determining censoring times and filtering data (CL10, L46-51), because that that allows sensing slow degradation that occurs over a long period in the presence of noisy background (C103, L56-65). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Willoughby et al.** with the method of **Gross et al.** that included the preprocessing comprising performing at least one of determining censoring times and filtering data. The artisan would have been motivated because that would that sensing slow degradation that occurred over a long period in the presence of noisy background.

**Willoughby et al.** does not expressly teach that the preprocessing comprises performing at least one of determining censoring times and segmenting data. **Cook** teaches that the preprocessing comprises performing at least one of determining censoring times and segmenting data (CL7, L10-13), because predictions can be made from interpretation of data segments (CL9, L63-65); and data segments can be used with classification modules to generate classifications (CL7, L10-13). It would have been obvious to one of ordinary skill in the art at the time of Applicants' invention to modify the method of **Willoughby et al.** with the method of **Cook** that included the preprocessing comprising performing at least one of determining censoring times

and segmenting data. The artisan would have been motivated because predictions could be made from interpretation of data segments; and data segments could be used with classification modules to generate classifications.

## *Conclusion*

23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Kandasamy Thangavelu whose telephone number is 571-272-3717. The examiner can normally be reached on Monday through Friday from 8:00 AM to 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kevin Teska, can be reached on 571-272-3716. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-9600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

K. Thangavelu
Art Unit 2123
January 22, 2005

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SUPERVISORY
PATENT EXAMINER